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EXAMINER

UHLIR, NIKOLAS J

ART UNIT	PAPER NUMBER
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1773

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DATE MAILED: 01/09/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/981,766

Applicant(s)

TAKAO ET AL.

Examiner

Nikolas J. Uhler

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 November 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5,7 and 10-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) 0 is/are allowed.
- 6) ☒ Claim(s) 1-5,7 and 10-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. This office action is in response to the amendment/request for reconsideration filed on 11/12/02. In light of this amendment, the 112 rejections found in the office action dated 5/09/02 are withdrawn. However, it should be noted that the rejection presented in the office action dated 5/09/02 under U.S.C 102(b) is maintained in light of the new matter rejection presented below. Further, if it is found that the limitations inserted by the amendment do not constitute new matter, a new rejection addressing these new limitations is detailed below following the original rejection.

Response to Amendment

2. The amendment filed 11/12/02, requests that a paragraph be entered "after page 5 line 7" of the specification. This amendment has not been entered, as it does not adopt the correct terminology for establishing the placement of an amendment within the specification. The examiner has been instructed by his Legal Instruments Examiner (LIE), who is responsible for the entry of amendments into patent applications that the applicant's instruction to insert the following paragraph "after page 5, line 7" is non-standard terminology and is unclear. The examiner respectfully suggests the applicant replace "please insert the following paragraph after page 5, line 7" with "please insert the following paragraph before the paragraph beginning on page 5, line 8," as this has been approved by the LIE as standard and acceptable terminology for the insertion of amendments into a specification. However, the examiner directs the applicant to the paragraphs below, wherein the content of the amendment to the specification is discussed under 35 U.S.C 112 1st paragraph and in the section entitled "Specification."

Specification

3. As stated above, the amendment filed 11/12/02 contained an amendment to the specification that was not entered. Specifically, the portion of the amendment which was not entered was the paragraph listed on page 3 of the amendment under "please insert the following paragraph after page 5, line 7." However, if this paragraph were entered into the specification, the following objection would apply.

4. The amendment filed 11/12/02 is objected to under 35 U.S.C. 132 because it introduces new matter into the disclosure. 35 U.S.C. 132 states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: The applicant in the amendment filed 11/12/02 requested a paragraph which describes carbothermal reactions to form aluminum nitride utilizing alkali metal. In addition this paragraph describes the negative impacts of alkali metals, in particular sodium, to AlN. This information was not originally presented in either the claims or specification as originally filed. Thus, this information is new matter.

Although this paragraph was not entered for the reasons detailed above, if the paragraph were entered, applicant would be required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

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6. Claims 1-5, and 7 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. In the instant case, claim 1 recites the limitations, "while not containing any other elements selected from an alkali metal," and "not in a batch type production." There is no support for these limitations in either the claims or the specification as originally filed. Thus, these limitations are new matter.

7. Further, the limitations "not containing any other elements selected from an alkali metal" and "not in a batch type production" are negative limitations. Applicant is directed to MPEP 2173.05(i), which states: "Any negative limitation or exclusionary proviso must have basis in the original disclosure. If alternative elements are positively recited in the specification, they may be explicitly excluded in the claims. See *In re Johnson*, 558 F.2d 1008, 1019, 194 USPQ 187, 196 (CCPA 1977) ("[the] specification, having described the whole, necessarily described the part remaining."). See also *Ex parte Grasselli*, 231 USPQ 393 (Bd. App. 1983), *aff'd mem.*, 738 F.2d 453 (Fed. Cir. 1984). The mere absence of a positive recitation is not basis for an exclusion." Correction is required.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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9. Claims 1-3, 5, 7 and 10, 13 and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Weimer et al. (US5126121) as evidenced by Pratsinis et al.

(US5525320).

10. For the purpose of this portion of the rejection, the examiner postulates that certain of the limitations entered by the amendment filed 11/12/02 do not constitute new matter.

11. The limitations "flame synthesized," and "manufactured in a vapor phase in the presence of a flame," and "manufactured continuously, not in a batch type production by using a raw material powder consisting of element Al, or a mixture of a powder consisting of elements Al and O and a powder consisting of element C" in claim 1, the entirety of claim 2, "prepared by subjecting the powder to heat treatment either continuously or intermittently in a temperature... to the powder" in claim 5, and the entirety of claims 10-19 are product by process limitations that do not appear to patentably distinguish the claimed invention from the prior art structure, regardless of how the prior art structure is manufactured. "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). See MPEP § 2113.

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12. Regarding the limitations of claim 1 wherein the applicant requires a flame synthesized aluminum nitride filler powder comprising elements Al, O, or N, or Al and N, while not containing any other elements selected from an alkali metal, wherein the particle size of the powder is 0.001-500 μ m, the mean particle size is between 0.1-100 μ m, whereby the external shape of the particles is spherical, and the powder is manufactured continuously, not through batch type production by using as a raw material powder consisting of element Al, or a mixture of a powder consisting of the elements Al and O and a powder consisting of element C.

13. Regarding these limitations, Weimer et al. teaches aluminum nitride powder which is produced by a process comprising the steps of passing aluminum powder and a nitrogen source through a heated reaction zone, to form aluminum nitride particles (column 3, lines 8-33). Weimer et al. teaches a specific embodiment in which particles of AlN having a diameter of 0.4-0.8 are formed utilizing this process (column 11, lines 40-46). Thus, the powder of Weimer et al. meets the particle size requirements of claim 1.

14. Regarding the requirement that the particles be "spherical." Although Weimer et al. does not specifically teach that the produced Aluminum Nitride particles are spherical, the examiner takes the position that this limitation is necessarily met for the following reasons. It is well known in the art that in the production of aluminum nitride particles via floating nitridation, wherein aluminum particles are entrained in nitrogen gas and passed through a heated reactor (see Weimer et al. column 2, lines 35-50), the temperature of the reaction zone has an impact on the morphology of the produced

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particles. Specifically, it is well known that spherical particles form at temperatures $>1373\text{K}$, whereas a mixture of rod shaped and spherical particles form at lower temperatures (as evidenced by Pratsinis et al. column 3, lines 18-36). The process utilized by Weimer et al. entrains aluminum particles in nitrogen gas and passes them through a heated reaction zone, and thus is a floating nitridation process (column 9, lines 9-30). Further, in a specific example the Weimer et al. process utilizes a reaction zone temperature $\sim 1600^{\circ}\text{C}$ (1873K), which well exceeds the 1373K mark that is known to produce spherical particles.

15. Regarding the requirement that the particles not contain any alkali metal. The examiner interprets this phrase to require that no alkali metal be intentionally added to the reaction, as small impurities of alkali metals such as sodium are prodigious and difficult to completely prevent. As Weimer et al. does not teach adding or using an alkali metal or an alkali metal compound in the reaction, this limitation is met.

16. The limitations of claim 2 are entirely product by process limitations, which have not yet been established to patentably distinguish the claimed product from that of the prior art. Applicant is referred to the paragraph addressing product by process limitations at the beginning of this section for more information.

17. Regarding the limitations of claim 3, wherein the applicant requires that the Aluminum Nitride powder be produced from a raw material consisting of the element Al, whose particle size is within the range of $0.01\text{-}500\mu$, and the nitridation reaction is proceeded by using a flame in the presence of nitrogen, ammonia, or an inert gas. Although these limitations are purely product by process addressed above, it should be

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noted that Weimer et al. does teach a process for forming spherical aluminum nitride particle having the require particle size from a raw material of 99.95% pure aluminum (column 5, lines 39-450. The examiner takes the position that 99.95% pure Al meets the requirement that the raw material "consist of element Al" as small levels of irremovable impurities will inherently be present in any raw material powder. Further, the Weimer et al. process utilizes either nitrogen or ammonia as the nitrogen source (column 8, lines 15-20). Thus, the limitations of claim 3 are met.

18. Regarding the limitations of claim 5, wherein applicant requires the powder of claim 1 to be heat treated either continuously or intermittently in a temperature range from 500-10,000⁰ C in the presence of air, nitrogen, ammonia, an inert gas, or vacuum, by using a flame or an apparatus capable of applying a high temperature to the powder. Although these limitations are purely product by process limitations as addressed above, it is noted that Weimer et al. teaches that the aluminum nitride powder is beneficially milled and subjected to a secondary reaction to increase the conversion of aluminum to aluminum nitride. This secondary reaction comprises subjecting the aluminum nitride powder to a heat treatment in a temperature range between 1123-1873K (850-1600⁰ C) (columns 8-9, lines60-20). Thus the limitations of claim 5 are met.

19. Regarding the limitations of claim 7, wherein the applicant requires the powder according to claim 1, wherein the powder is used as a raw material in a composite material system in which the powder is filled in a resin type raw material comprising organic materials. Weimer et al. teaches the incorporation of the AlN particles into an organic binder (column 12, lines 34-38). Thus, the limitations of claim 7 are met.

20. Regarding the limitations of claims 10, 13, wherein the applicant requires the powders recited in claims 2 and 3 respectively to be heat treated in a temperature range of 500-10,000°C (claims 10, 13, 15). These limitations are met as set forth above for claim 5 above.

21. Regarding the limitations of claim 20, wherein the applicant requires an aluminum nitride filler-powder "consisting of" elements Al, O, or N, **or** "consisting of" elements Al and N, wherein the particle size of the powder is from 0.001-500µm, the mean particle size thereof is from 0.1-100µm, and the external shape of the particles is spherical. These limitations are met as set forth above for claim 1.

Claim Rejections - 35 USC § 103

22. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

23. Claims 12-15, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weimer et al. evidenced by Pratsinis et al. as applied to claim 1 above, and further in view of Parent et al.

24. Weimer et al. as evidenced by Pratsinis et al. does not teach incorporating the AlN particles of claims 2-3, 5 and 10 into a resin binder, as requires by claims 12-15 and 19.

25. However, Parent et al. teaches that AlN particles are useful for reinforcing many types of matrices, including polymer matrices (column 7, lines 48-58). It is the

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examiners position that a polymer material is equivalent to applicant's claimed "resin type" material comprising organic materials.

26. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the heat treated powder taught by Weimer et al. into a polymer material, as taught by Parent et al.

27. One would have been motivated to make this modification due to the teaching in Parent et al. that AlN powders are useful for reinforcing polymer matrices.

28. Claims 1, and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weimer et al. (US5219804) in view of Weimer et al. (US5126121), as evidenced by Pratsinis et al.

29. For the purpose of clarity, the Weimer et al. references will be referred to as Weimer 804 and Weimer 121.

30. It should be noted that the comments regarding product by process limitations as stated above also apply to this portion of the rejection

31. Regarding the limitations of claims 1 and 4, wherein the applicant requires spherical Aluminum Nitride filler powder comprising the elements Al, O, and N, or Al and N that has a particle size between 0.001-500 μ , and a mean particle size between 0.1-100 μ (claim 1), wherein the AlN filler powder is formed from a raw material powder that is a mixture of a powder consisting of the elements Al and O and a powder consisting of the element C, wherein the raw material powder has a particle size between 0.001-500 μ (claim 4).

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32. Regarding these limitations, Weimer 804 teaches a specific example in which Aluminum Nitride Powder is formed from a mixture of alumina powder and carbon black in a floating nitridation apparatus at 2173K (column 9, lines 5-67). The aluminum oxide (alumina) typically has a particle size in the range of 0.05-20 μ m (column 4, lines 40-47). Although Weimer et al. does not teach that the product powder is spherical as required by claim 1, the examiner takes the position that this limitation is met, as it is well known in the art that spherical AlN forms at temperatures >1373K in floating nitridation processes, as evidenced by Pratsinis et al. (Pratsinis et al. column 3, lines 18-36).

33. Weimer 804 as evidenced by Pratsinis et al. does not teach the particle size of the carbon raw material, as required by claim 4.

34. However, Weimer 121 teaches a floating nitridation process to form aluminum nitride from an aluminum powder and a carbon powder. Suitable carbon powders for this process typically have a particle size in the range of 0.01-1.0 μ (column 6, lines 1-10).

35. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize 0.1-1.0 μ carbon powder as taught by Weimer 121 in the process of Weimer 804.

36. One would have been motivated to make this modification due to the fact that both references are concerned with forming Aluminum Nitride via floating nitridation utilizing aluminum based powder and carbon powder as precursors, and the fact that Weimer 121 teaches that 0.1-1.0 μ carbon powder is suitable for this purpose.

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37. Regarding the limitations of claim 16, wherein the applicant requires the powder of claim 4 to be heat treated in a temperature range between 500-10,000⁰ C in the presence of air, nitrogen, ammonia, an inert gas, or vacuum by using a flame or an apparatus capable of applying a high temperature to the powder.

38. Although the limitations of claim 16 are purely product by process, it is noted that Weimer 804 teaches post treating the aluminum nitride powder formed from alumina and carbon at a temperature of 2573⁰ C. Thus, these limitations are met.

39. Claims 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weimer 804 in view of Weimer 121, as evidenced by Pratsinis et al. as applied to claim 1 above, and further in view of Parent et al.

40. Weimer 804 as in view of Weimer 121, as evidenced by Pratsinis et al. does not teach incorporating the AlN particles of claims 2-3, 5 and 10 into a resin binder, as requires by claims 17 and 18.

41. However, Parent et al. teaches that AlN particles are useful for reinforcing many types of matrices, including polymer matrices (column 7, lines 48-58). It is the examiners position that a polymer material is equivalent to applicants claimed "resin type" material comprising organic materials.

42. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the heat treated powder taught by Weimer 804 in view of Weimer 121 as evidenced by Pratsinis et al. into a polymer material, as taught by Parent et al.

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43. One would have been motivated to make this modification due to the teaching in Parent et al. that AlN powders are useful for reinforcing polymer matrices.

Response to Arguments

44. Applicant's arguments filed 11/12/02 have been fully considered but they are not persuasive. In the instant case, the applicant made the argument that Parent et al. does not teach an Aluminum Nitride powder that does not contain alkali metal. In light of the fact that this limitation is new matter, this argument is moot. However, should it be found that this limitation is not new matter, the argument is moot in view of the new grounds of rejection over the Weimer et al. patents.

45. Further, applicant made the argument that the Parent et al. patent fails to teach a continuous process for manufacturing Aluminum Nitride powder. The examiner maintains that this limitation is a product by process limitation. Further, this process has not been shown to patentably distinguish applicant's **product** from that of the prior art. Applicants are respectfully reminded that the instant application is directed towards a **product, not a method of manufacture**. In order to show criticality of the process in a product by process limitation, applicants need to show some unexpected result for the **product** produced that is a direct result of the process utilized to form that product. As yet, applicants have failed to demonstrate the criticality of the process in forming a product that is patentably distinct from the products known in the prior art. Thus, prior art that forms what appears to be an identical end product as that of the instant application, albeit by a different process, reads on the presently claimed subject matter.

Conclusion

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46. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Japanese Patent #JP404074705A to Sato et al. is considered to be pertinent to the instant application. This reference details a process for forming spherical 7-300 μ m Aluminum Nitride powder that is useful as a filler in composite materials.

47. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nikolas J. Uhler whose telephone number is 703-305-0179. The examiner can normally be reached on Mon-Fri 7:30 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Thibodeau can be reached on 703-308-2367. The fax phone numbers

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for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-0389.



nju
January 7, 2003



STEVAN A. RESAN
PRIMARY EXAMINER